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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/730,747	12/08/2003	Robert M. Koehl	085455-9455-00	2653

23409 7590 12/14/2005

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EXAMINER	
SAYOC, EMMANUEL	

ART UNIT	PAPER NUMBER
3746	

DATE MAILED: 12/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)
	10/730,747	KOEHL, ROBERT M.
	Examiner	Art Unit
	Emmanuel Sayoc	3746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 October 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *20-35 and 87* is/are pending in the application.

4a) Of the above claim(s) *9-19,36-63 and 72-76* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *20-35 and 87* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 December 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the amendments of 10/13/2005. In making the below rejections and/or objections the examiner has considered and addressed each of the applicants arguments. Claims 20-35, and 87 are pending, and are under current consideration. Claims 1-8, 64-71, and 77-86 have been cancelled, and claims 9-19, 36-63,and 72-76 are withdrawn.

Election/Restrictions

2. Applicant's election without traverse of Group II., claims 9-63, and 72-76, and species B in the reply filed on 5/6/05 is acknowledged.

Claims 9-19, 36-63,and 72-76 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 5/6/05.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 20, 21, 24, 25, 28, 29, 32, 33, and 87are rejected under 35 U.S.C. 103(a) as being unpatentable over Lifson et al. (U.S. 6,925,823 B2) and Konrad (U.S. 5,883,489).

Lifson et al., in Figure 1, teach a pump motor (51) and control circuit apparatus (53) and associated method comprising measuring the temperature at the motor, where internal components of the compressor constitute heat sinks in that the components conduct heat and releases it to the environment (column 3 lines 18-29). The control circuit (53) also teaches the measurement of compressor motor current and voltage (see Abstract). Any one of these parameters can be used for the control circuit apparatus, in fact Lifson et al., in column 4 lines 36-48, teach a wide variety of compressor/motor parameters that can be used. These parameters are compared to predetermined maximum reference values (see Abstract, column 3 lines 10-61), and if these values exceed the predetermined reference values, the control apparatus protects the compressor/motor by reducing the load of the motor by reducing power and speed (column 3 lines 30-44, and column 4 lines 8-35), or in extreme conditions shutting down the motor (see Abstract, column 3 lines 18-28). The current, temperature or voltage limit setting constitutes a programmed threshold. As is consistent with the applicant's specification, the terms "limp mode" and "limp current limit" are interpreted to be a state of pump motor operation at reduced power or speed (reduced voltage and current to the motor), and the limit at which this state occurs, respectively. As is, if the sensed current, temperature, or voltage exceeds a predetermined limit value, (which constitutes

a limp current, voltage, or temperature limit), the control circuit (53) reduces speed of the motor by reducing power. Although the reference does not explicitly say that this is achieved by reducing voltage or excitation power frequency to the motor, one of ordinary skill in the art would have known this since in an apparatus with constantly supplied power such as Lifson et al., the product of current and voltage equals power. In a variable speed motor as taught by Lifson et al. (column 4 lines 9-15) it is evident that the speed is reduced by reducing the power to the motor, i.e. reducing voltage or current. Lifson et al. suggests the direct relationship of voltage to power in column 4 line 31-35. At the time the invention was made, variable speed pump motor were commonly energized using pulse width modulation (PWM), such as the pump taught by Konrad. Within the art it was well known to use inverters to provide pulse width modulation to generate variable frequency and voltage power to pump motors. Konrad in Figure 1, teaches a pump with PWM and an inverter controller (7). Konrad teaches that increasing the motor frequency, gradually increases the power to the motor (2) and hence the speed of the motor (2), see column 11 lines 1-35. It is evident that in PWM of power to a motor that frequency, current, and voltage are proportional to the duty cycle of the PWM. PWM was a practical implementation of automated power delivery control and was based upon the relationships of current, voltage, and frequency, to AC power. Therefore it follows that, regardless of whether or not the variable speed motor of Lifson et al. was implemented though PWM, the reduction in power or motor speed, is achieved by directly or indirectly reducing voltage and/or frequency. This operation at reduced power constitutes operation in a limp mode.

The motor is driven in the limp mode without generating a fault condition code.

5. Claims 22, 23, 26, 27, 30, 31, 34, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lifson et al., as modified by Konrad, as applied to claims 20, 21, 24, 25, 28, 29, 32, and 33, and in further view of Lane Jr. (U.S. 5,512,883).

The Miyamoto et al., as modified by Gillett et al., device set forth a device as described above, which is substantially analogous to the claimed invention. The Miyamoto et al., as modified by Gillett et al., device differs from the claimed invention in that there is no teaching of generating the fault condition code while shutting down the motor or indicating to a user that the motor is operating in the limp mode. One of ordinary skill would have appreciated that it is important for a user to be able to interact and monitor the operation of a pump in order to better ensure operation safety and efficiency. Lane Jr. in Figure 1, teaches a method and device for monitoring the operation of a motor, which is usable on a pump. In column 1 lines 17-20, Lane Jr. teaches that the current drawn by a motor is indicative of the operating condition of the motor. If the current level is too small, the motor may not be able to sufficiently provide enough power to the application, and if the current is too large the motor may wear or be damaged, thus it is clearly important to monitor the motor current. In column 1 lines 55-67, the Lane Jr. device produces an alarm such that the controller or the operator can recognize the malfunction for subsequent diagnosis, correction or shut-off for motor protection. The current is sensed by a transducer (144) and compared to minimum and

maximum thresholds. In column 3 lines 60 to column 4 line 13, the monitoring device (100) stored a plurality of events including error conditions such as high current event (118), low current event (120), and sustained high current (122). Error codes are displayed on an error condition display (108). In column 5 lines 28-34, Lane Jr. teaches that the motor is controlled according to current conditions, and is suitable for compressor motors. Therefore it would have been obvious to one of ordinary skill in the art at time the invention was made to further modify the Miyamoto et al., as modified by Gillett et al., device by generating the fault or error condition code while shutting down the motor or indicating to a user that the motor is operating in the reduced power or limp mode, as taught by lane Jr., in order to advantageously notify the operator such that the malfunction can be recognized for subsequent diagnosis, correction or shut-off for motor protection.

6. Claims 20, 21, 28, 29, and 87 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyamoto et al. (JP 405010270 A), and Gillett et al. (U.S. 5,123,080).

Miyamoto et al. in Figure 1, teach a pump and control circuit apparatus and associated method comprising measuring current being provided to the motor (M1) via current measuring circuit (16), and determining whether the current is greater than a limp current limit setting (upper limit value), see English abstract. Since the power source (11) supplies power to the motor (M1), the current measurement constitutes a measurement of bus current, or line current. The current limit setting constitutes a

programmed threshold. As is consistent with the applicant's specification, the terms "limp mode" and "limp current limit" are interpreted to be a state of pump motor operation at reduced power (reduced voltage and current to the motor), and the limit at which this state occurs, respectively. As is further described, if the sensed current exceeds a current limit value (which constitutes a limp current limit), the microcontroller (Figure 1) reduces voltage, and therefore power to the motor.

The Miyamoto et al. device differs from the claimed invention in that there is no explicit teaching that the motor is shut down if the motor does not operate within operational limits while being driven in limp mode. One of ordinary skill in the art would have known that power overload or excessive voltage or current to the motor could damage the motor. It was well known to provide a motor shutdown circuit to protect the motor in extreme cases where the motor power cannot simple be reduced to resume operation. Gillett et al. in Figure 1 teach an analogous pump/compressor drive control system which addresses motor overload by shutting down the motor. In columns 1 line 40-60, the controller monitors voltage and current levels, as well as temperature (column 5 lines 62-68). In column 5 lines 7-35 Gillett et al. teach monitoring current and voltage to the motor and in the event that these values exceed maximum (and minimum) values, the motor is shut down. Gillett et al. teaches that it was well-known o drive pump motors by pulse width modulation (column 4 lines 59-68). The supplied power and speed of the motor is easily and electronically adjusted using pulse width modulation. Therefore it would have been obvious to one of ordinary skill in the art at time the invention was made to modify the Miyamoto et al. device by, incorporating the

pulse width modulation (PWM) control, and the over voltage and current shut down circuits as taught by Gillett et al., in order to advantageously adjust power and speed of the motor easily and electronically, and in order to protect the motor from damage. Within the art it was well known to use inverters to provide pulse width modulation to generate variable frequency and voltage power to pump motors (see cited art below). It is evident that in PWM of power to a motor that frequency, current, and voltage are proportional to the duty cycle of the PWM. Therefore it follows that in the PWM implementation in Miyamoto et al., as modified by Gillett et al., that the reduction in power is achieved by directly or indirectly reducing voltage (see English Abstract) and/or frequency. This operation at reduced power constitutes operation in a limp mode.

The Miyamoto et al., as modified by Gillett et al., motor is driven in the limp mode without generating a fault condition code.

7. Claims 22, 23, 30, 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyamoto et al., as modified by Gillett et al., as applied to claims 20, 21, 28, and 29, and in further view of Lane Jr. (U.S. 5,512,883).

The Miyamoto et al., as modified by Gillett et al., device set forth a device as described above, which is substantially analogous to the claimed invention. The Miyamoto et al., as modified by Gillett et al., device differs from the claimed invention in that there is no teaching of generating the fault condition code while shutting down the motor or indicating to a user that the motor is operating in the limp mode. One of

ordinary skill would have appreciated that it is important for a user to be able to interact and monitor the operation of a pump in order to better ensure operation safety and efficiency. Lane Jr. in Figure 1, teaches a method and device for monitoring the operation of a motor, which is usable on a pump. In column 1 lines 17-20, Lane Jr. teaches that the current drawn by a motor is indicative of the operating condition of the motor. If the current level is too small, the motor may not be able to sufficiently provide enough power to the application, and if the current is too large the motor may wear or be damaged, thus it is clearly important to monitor the motor current. In column 1 lines 55-67, the Lane Jr. device produces an alarm such that the controller or the operator can recognize the malfunction for subsequent diagnosis, correction or shut-off for motor protection. The current is sensed by a transducer (144) and compared to minimum and maximum thresholds. In column 3 lines 60 to column 4 line 13, the monitoring device (100) stored a plurality of events including error conditions such as high current event (118), low current event (120), and sustained high current (122). Error codes are displayed on an error condition display (108). In column 5 lines 28-34, Lane Jr. teaches that the motor is controlled according to current conditions, and is suitable for compressor motors. Therefore it would have been obvious to one of ordinary skill in the art at time the invention was made to further modify the Miyamoto et al., as modified by Gillett et al., device by generating the fault or error condition code while shutting down the motor or indicating to a user that the motor is operating in the reduced power or limp mode, as taught by lane Jr., in order to advantageously notify the operator such that the

malfunction can be recognized for subsequent diagnosis, correction or shut-off for motor protection.

8. Claims 24, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyamoto et al., as modified by Gillett et al., as applied to claim 20, and in further view of Denpou. (U.S. 4,912,936).

The Miyamoto et al., as modified by Gillett et al., device set forth a device as described above, which is substantially analogous to the claimed invention. The Miyamoto et al., as modified by Gillett et al., device differs from the claimed invention in that there is no teaching of the voltage detected being compared to a voltage threshold. Denpou in Figure 1 teaches a compressor control system that detects voltage to the compressor (9), via detector (19). The control circuit (29) compares the voltage to reference values to accordingly drive the compressor (9). Under constant power supply to the compressor, which is the case here and in Meza et al., the supply voltage is proportional to the current. Therefore similar motor operation information can be obtained from the voltage as with the current. This is suggested in the Abstract line 18.

Therefore it would have been obvious to one of ordinary skill in the art at time the invention was made to modify the Miyamoto et al., as modified by Gillett et al., device by, basing control off a supply voltage reading and voltage comparison, as taught by Denpou, as a functional equivalent of the current detecting schema. As the applicant has presented various alternatives of parameters measured (current, voltage, and

temperature), it is evident that the particular parameter measured is not a critical or central aspect to the claimed invention, and that the control methods using different parameters are functionally equivalent. The applicant has not provided an indication why a particular parameter is critical, or unexpectedly advantageous over another. Finally the Miyamoto et al., as modified by Gillett et al., device would certainly function substantially the same using voltage as a controlling parameter in place of current.

9. Claims 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyamoto et al., as modified by Gillett et al. and Denpou, as applied to claims 24 and 25, and in further view of Lane Jr. (U.S. 5,512,883).

Miyamoto et al., as modified by Gillett et al. and Denpou, set forth a device as described above, which is substantially analogous to the claimed invention. The Miyamoto et al., as modified by Gillett et al. and Denpou, device differs from the claimed invention in that there is no teaching of generating the fault condition code while shutting down the motor or indicating to a user that the motor is operating in the limp mode. One of ordinary skill would have appreciated that it is important for a user to be able to interact and monitor the operation of a pump in order to better ensure operation safety and efficiency. Lane Jr. in Figure 1, teaches a method and device for monitoring the operation of a motor, which is usable on a pump. In column 1 lines 17-20, Lane Jr. teaches that the current drawn by a motor is indicative of the operating condition of the motor. If the current level is too small, the motor may not be able to sufficiently provide

enough power to the application, and if the current is too large the motor may wear or be damaged, thus it is clearly important to monitor the motor current. In column 1 lines 55-67, the Lane Jr. device produces an alarm such that the controller or the operator can recognize the malfunction for subsequent diagnosis, correction or shut-off for motor protection. The current us sensed by a transducer (144) and compared to minimum and maximum thresholds. In column 3 lines 60 to column 4 line 13, the monitoring device (100) stored a plurality of events including error conditions such as high current event (118), low current event (120), and sustained high current (122). Error codes are displayed on an error condition display (108). In column 5 lines 28-34, Lane Jr. teaches that the motor is controlled according to current conditions, and is suitable for compressor motors. Therefore it would have been obvious to one of ordinary skill in the art at time the invention was made to further modify the Miyamoto et al., as modified by Gillett et al. and Denpou, device by generating the fault or error condition code while shutting down the motor or indicating to a user that the motor is operating in the reduced power or limp mode, as taught by Lane Jr., in order to advantageously notify the operator such that the malfunction can be recognized for subsequent diagnosis, correction or shut-off for motor protection.

Response to Arguments

10. Applicant's arguments with respect to claims 20-35, and 87, filed 10/31/05 have been considered but are moot in view of the new ground(s) of rejection.

The rejections based on Meza U.S. 2004/0009075 have been replaced with new rejections in view of the applicants claim to common ownership of the Meza prior art invention.

Since new grounds of rejection have been made, this office action is being made non-final to afford the applicant the opportunity to respond to the new grounds of rejection.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following references are cited to further show the state of the art with respect to pump control.

U.S. Pat. 6,623,245 B1 to Meza et al. – teach a current and temperature sensing pump controller

U.S. Pat. 4,353,220 to Curwen et al. – teach temperature measurement and compressor shut down in error conditions

U.S. Pat. 3,787,882 to Fillmore et al. – teach general nature of the art

U.S. Pat. 6,102,665 to Centers et al. – teach a compressor shut down in various parameter measurement in excess of threshold

U.S. Pat. 5,342,176 to Redlich – teaches compressor control based on voltage and current readings

Contact Information

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Sayoc whose telephone number is (571) 272 4832. The examiner can normally be reached on M-F 8-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy S. Thorpe can be reached on (571) 272-4444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Emmanuel Sayoc
Examiner
Art Unit 3746

ECS